



**CHAPTER 2**  
NATIONAL AIRSPACE SYSTEM  
PERFORMANCE

## **2 National Airspace System Performance**

The Chief Financial Officers' Act of 1990 requires the systematic measurement of performance and the Government Performance Results Act of 1993 (GPRA) holds agencies accountable for achieving specific results. During the past 6 years, the Department of Transportation's Performance Plan developed a series of measures for FAA programs and results, which were supported and augmented by additional metrics in the FAA Performance Plan and the Air Traffic Services Performance Plan. The FAA has increased its emphasis on measuring how well it is meeting the expectations of its customers and managers, based on direction from the Congress that the FAA be operated as a performance-based organization.

### **2.1 System Performance and Performance Goals**

A key to the transformation of the FAA into a performance-based organization is the development of a series of metrics by which the performance of the agency can be measured. Some of these proposed metrics have been long-time FAA goals that were presented and tracked in annual FAA plans, but others are more detailed examinations of aviation activity and system performance.

Much of the impetus for creating a more responsive FAA began with pressure from the Congress, the DOT, the airlines and the media to find a solution to the dramatic increase in flight delays, which peaked during the summer of 2000. Two important FAA initiatives in response to this concern were the development of the Aviation System Performance Metrics (ASPM) system, which is discussed later in this chapter, and the Airport Capacity Benchmark Report, which was featured in last year's ACE Plan. The FAA is continuing to develop the ASPM system and is updating the Benchmark Report.

#### **2.1.1 Performance Goals**

The FAA's final FY 2002 and preliminary FY 2003 performance goals are divided into three categories:

- GPRA Goals: outcome-oriented goals that define success at the FAA corporate level and are reported in the DOT Performance Plan and Report;
- Supplemental Goals: high visibility output-oriented goals that help accomplish GPRA goals; and,
- Organizational Excellence Goals: internal corporate goals focused on meeting customer, employee, and financial expectations

The primary GPRA goal related to this plan is the FAA's performance goal for aviation delay, which is to add aviation system capacity at a rate that matches demand, so that on-time arrival performance improves by one percentage point per year. The airlines, the FAA and DOT's Bureau of Transportation Statistics have all agreed to use the percentage of flights arriving on time (within 15 minutes of scheduled arrival time) as a common measure of aviation delay. A target for 2001 was not established; however, the actual percentage of on-time flights improved from 74.9 percent in 2000 to 76.2 percent in 2001.

The FAA supplementary performance measures that are related to the performance goal for aviation delay are: aviation delays per 100,000 activities; the cumulative increase

in throughput during peak periods at certain major airports; the cumulative increase in direct routings for the en route phase of flight; the percentage of runways in good or fair condition; and, the number of runways accessible in low visibility.

### **2.1.2 Performance Metrics for the Large-Hub Airports**

The FAA is also developing a set of performance indicators that will be used to assess the performance of the large-hub airports. Focusing on these airports will improve the efficiency of the entire NAS since so much traffic passes through these airports. The primary service performance indicators for the operations of the NAS include:

- Percentage of on-time arrivals
- Average minutes of arrival delay
- Ground stop minutes of delay
- Ground delay program minutes of delay
- Average daily arrival capacity
- Airport arrival efficiency rate

These performance indicators rely upon a variety of data sources from DOT and FAA, including the Aviation System Performance Metrics System, the Operations Network (OPSNET), the Enhanced Traffic Management System, and the Air Carrier Statistics Monthly. These, and other, performance indicators are still under development and will be reported on in greater detail in next year's ACE Plan.

## **2.2 Delays in the National Airspace System**

Delay is the traditional measure of NAS performance, but it is not a straightforward measure to calculate on either an individual flight, for an airport, or for the entire system. There are many delay parameters that can be tracked.

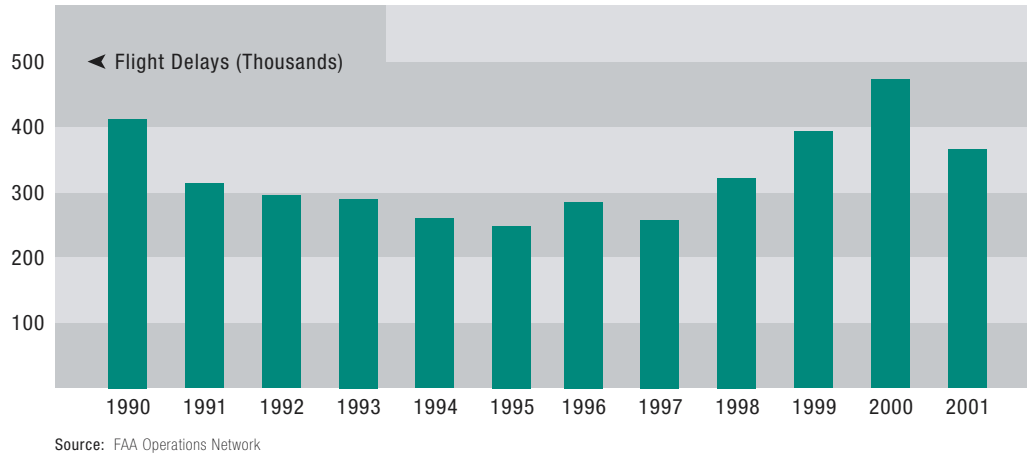
By any measure, the number of delays decreased significantly in 2001. This was to be expected, given the decline in traffic during much of the year, especially following September 11. This trend was true for the entire system, as well as for individual airports, although the magnitude of the changes varied among them. Generally, the decline in the number of delays was far greater than the decline in the number of operations because both the system and many of the largest airports had been operating at or near their theoretical capacity. In these cases, the decrease in the number of operations had a disproportionate impact on delays. A related response was observed in 1999 and 2000, when a relatively small increase in the number of operations produced a large increase in the number of delays.

### **2.2.1 Delays Reported by the Operations Network**

The FAA reports the delay performance of the NAS every month, using data from OPSNET. These data come from observations by FAA personnel, who record only aircraft that are delayed by 15 minutes or more during any phase of flight. According to OPSNET data 348,103 flights were delayed in CY 2001, a decrease of 102,186 delays or 22.7 percent

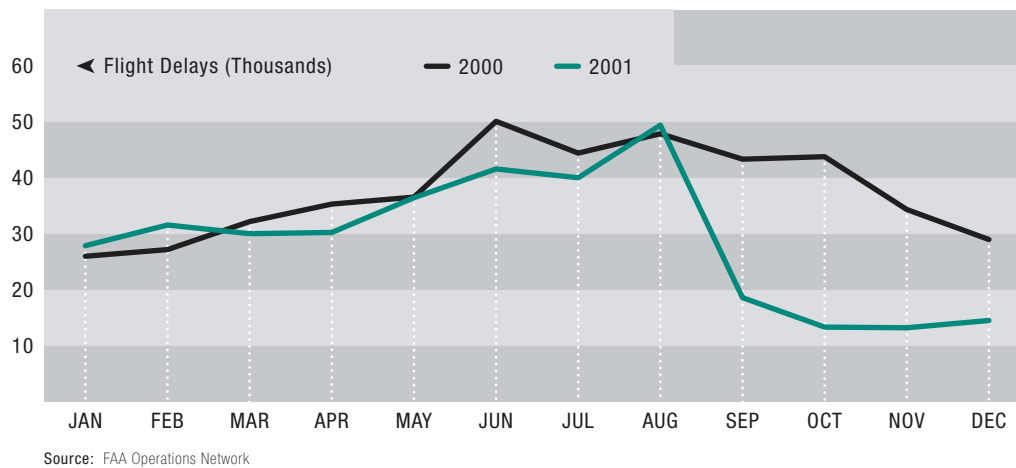
from the 450,289 flight delays in CY 2000. Figure 2-1 shows flight delays for the years for which OPSNET data are available.

**Figure 2-1** Annual Flight Delays CY 1990-CY 2001



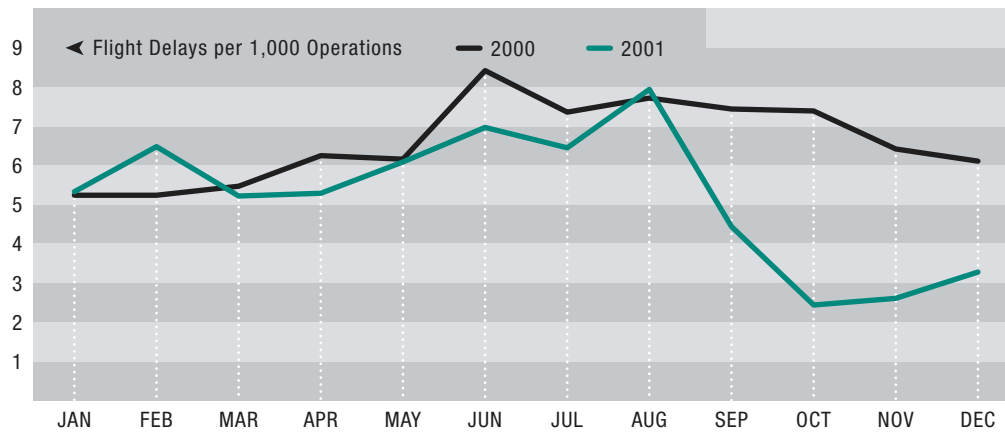
However, the decreases in delays in 2001 over 2000 were largely the result of the decrease in flying after September 11. Delays for the period from January-August 2001 were 287,320, only a marginal decrease from the 299,767 recorded in the same period in 2000 (a decrease of 4.2 percent). In contrast, for the period from September-December 2001, only 60,783 delays were recorded, a huge decrease from the 150,522 recorded in the same period in 2000 (a decrease of 59.6 percent). Figure 2-2 highlights the sharp divergence after September 11.

**Figure 2-2** Flight Delays by Month, CY 2000 and CY 2001



The total number of aircraft operations during the same period was down by only 3.3 percent. Thus, the rate of delays decreased as well as the absolute number of delays. Figure 2-3 shows the number of delays per 1,000 aircraft operations, by month, for 2000 and 2001. The sharp drop in the rate of delays after September 11 is readily apparent.

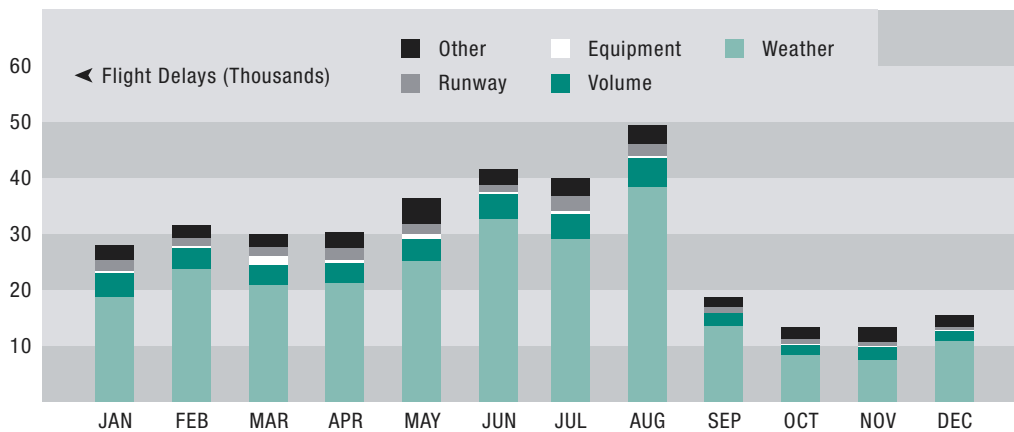
**Figure 2-3** Flight Delays per 1,000 Operations by Month, CY 2000 and 2001



Source: FAA Operations Network

One of the most valuable aspects of the OPSNET system is that it attributes each delay to one of several causal factors: weather, traffic volume, NAS equipment outages, closed runways, and other causes. The primary causes of delay have varied little year over year, with a large majority of delays attributed to weather (from 65 to 75 percent) and a smaller but significant percentage to traffic volume (12 to 22 percent.) Figure 2-4 shows the distribution of delays by cause for CY 2001.

**Figure 2-4** Flight Delays by Cause CY 2001



Source: FAA Operations Network

In response to numerous inquiries this year, the FAA began tracking ground delays throughout the NAS. Ground Delay Programs are implemented to control the volume of air traffic to airports where the projected traffic demand is expected to exceed the airport's acceptance rate for a lengthy period of time. The determination that delays are expected to be long lasting rather than temporary is based on the evaluation of weather conditions, forecasts, and projected demand.

The most common reason for the imposition of a Ground Delay Program is the reduction of the airport's acceptance rate, most often because of adverse weather conditions

such as low ceilings and visibility. There were 94,909 ground delays recorded in CY 2001, down sharply from the previous year's 135,752, a decrease of 31.1 percent. As with other measures of activity and delay, much of the decline took place in the last 4 months of the year.

### **2.2.2 The Aviation System Performance Metrics System**

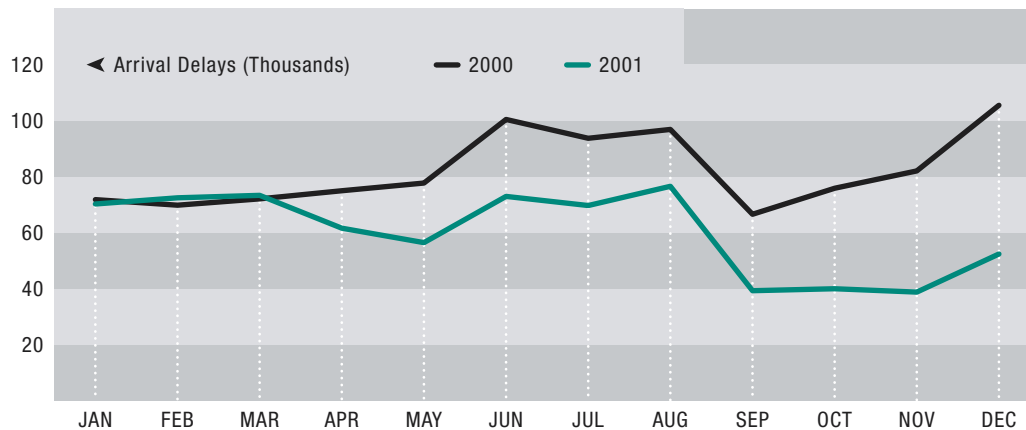
The FAA has developed a new delay measurement system, in cooperation with the Department of Transportation and the airlines, called the Aviation System Performance Metrics (ASPM) system. In November 1999, the FAA, the Air Transport Association and a number of air carriers agreed to share data so that a common set of performance metrics could be computed. The participants agreed that the metrics would be made available without any attempt to assign causality. Currently, 49 airports comprise the ASPM system.

Ten large air carriers have agreed to provide actual flight times directly to the FAA every day through ARINC, a private aviation services company. The times on an individual flight that will be provided are the Out, Off, On and In (OOOI) times. Flight times for four other air carriers are added to the ASPM database once a month, using data that are reported to the Department of Transportation's Bureau of Transportation Statistics. Flight times for all other carriers are estimates. For each individual flight, the OOOI data are merged with data from the FAA's Enhanced Traffic Management System (ETMS) and the Official Airline Guide.

Congress had directed the FAA and the Department of Transportation's Bureau of Transportation Statistics (BTS) to develop a common system for reporting delays. The FAA and BTS have agreed upon a common definition of delay: a flight will be considered delayed if it arrives at the destination gate 15 minutes or more after its scheduled arrival time. ASPM is now being used by the FAA and the DOT Inspector General in tracking delays and other measures of the performance of the NAS. ASPM provides a great deal of descriptive data. A recent DOT report on airline industry metrics cited a number of these, including the following: actual arrivals, arrival delays, the average length of those delays, the percentage of flight departing late, cancellations, the percentage of flights arriving late, gate departure delays, and the length of gate departure delays. Figure 2-5 shows the number of arrival delays for the past 2 calendar years. Arrival delays in CY 2001 decreased to 719,862 from the previous year's 983,565 (a decrease of 26.8 percent).



**Figure 2-5** Arrival Delays for CY 2000 and CY 2001



Source: FAA Aviation System Performance Metrics System

The rate of decrease in arrival delays was much greater in the last 4 months of 2001, following the events of September 11, at 48.5 percent, than in the preceding 8 months.

## 2.3 Performance Data Analysis and Reporting System

The previous sections have discussed performance measures that are released to the public and are used by both government and industry analysts to evaluate the performance of the NAS. The FAA is also developing some measurement tools that are more closely tailored to the daily operation of the air traffic control system. One of these is the Performance Data Analysis and Reporting System (PDARS), a set of tools that assists ATC facility managers in measuring the performance of their facilities. The FAA's Office of System Capacity and NASA's Aviation Safety Program developed it collaboratively.

PDARS extracts radar data from the Host or ARTS computers and processes and distributes these data to FAA facilities via a secure Intranet. These data can be analyzed to uncover the root causes of impediments to NAS operations. PDARS provides the analyst with a set of interactive tools that can access the distributed database of operational data to measure, analyze, and report system performance. PDARS also maintains an archive of historical data, which supports trend analysis and before-after comparisons.

PDARS's operational performance data can be depicted both numerically and graphically. The numerical tools provide the capability to see the large-scale picture of system performance and enable the analyst to identify the causes of performance problems. Reports can be exported to spreadsheet and slide presentation packages. The heart of the graphical depiction system is the Graphical Airspace Design Environment (GRADE), which provides users with a three-dimensional view of airspace and air traffic. GRADE graphics can be exported to slide presentation packages.

PDARS has been deployed at Bay, Northern California, Southern California, Phoenix, Dallas/Ft. Worth, and Houston TRACONS; Oakland, Los Angeles, Albuquerque, Ft. Worth, Houston, and Indianapolis centers, as well as the Air Traffic Control System Command Center. It is scheduled to be deployed at the Jacksonville, Memphis, Atlanta, and Miami centers.